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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,354	05/18/2006	Gerhard Schanz	3578	4394

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EXAMINER
ZALASKY, KATHERINE M

ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
04/12/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

striker@strikerlaw.com

Office Action Summary	Application No.	Applicant(s)	
	10/563,354	SCHANZ ET AL.	
	Examiner	Art Unit	
	KATHERINE ZALASKY	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-23, as amended 22 February 2010, are currently pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hemming ("10.3 Liquid-Liquid Extraction (Solvent Extraction)") in view of Schubert et al. (US 6,082,891) and Ehrfeld et al. (US 2003/0039169).

Regarding **claims 1, 20 and 22**, Hemming discloses a process for extracting a substance from one of at least two immiscible fluid phases (10.3.1 Physical Basics, ¶1-2), comprising the steps of:

- providing at least a first fluid and a second fluid that, after mixing form at least two immiscible fluid phases wherein the first fluid contains at least one substance that is extractable by the second fluid (10.3.1 Physical Basics, ¶1-2, 10.3.2 Extraction Equipment, ¶1-3)
- allowing the at least two immiscible fluid layers to separate (10.3.2 Extraction equipment, ¶1-3)

The reference does not disclose the process comprising the steps of mixing the first fluid and the second fluid by means of at least one static micromixer wherein said at

least one micromixer comprises at least one component in the form of a disk; said disk comprises a single mixing zone, at least one inlet opening disposed in a plane of said disk for introduction of at least one feed stream into a linking channel and with at least one outlet opening disposed in the plane of said disk for outflow of the stream directly into said single mixing zone, said at least one inlet opening being connected with said at least one outlet opening in a communicating manner via said linking channel which is disposed in the plane of said disk; said linking channel is divided once into more than two part channels by microstructure parts immediately prior to opening into the mixing zone, and each of the part channels has a respective width in a millimeter to sub-millimeter range and said width is smaller than the width of the mixing zone; and, said microstructure parts are in contact with said mixing zone.

Schubert et al. discloses a static micromixer (abstract) wherein said at least one micromixer comprises at least one component in the form of a plate (C2/L40-48); said disk comprises a single mixing zone (Figure 2, 9C, C2/L62-C3/L6), at least one inlet opening (Figure 2, 7A, C2/L62-C3/L6), disposed in a plane of said disk for introduction of at least one feed stream into a linking channel and with at least one outlet opening disposed in the plane of said disk for outflow of the stream directly into said single mixing zone, said at least one inlet opening being connected with said at least one outlet opening in a communicating manner via said linking channel which is disposed in the plane of said disk (Figure 1 & 2, C2/L62-C3/L6, 7A, 9C inlets and outlets inherent from figures); said linking channel is divided once into more than two part channels by microstructure parts immediately prior to opening into the mixing zone (Figure 1, 4A, 4B,

C2/L40-61), and each of the part channels has a respective width in a millimeter to sub-millimeter range and said width is smaller than the width of the mixing zone (C4/L44-51, preferably less than 500 microns); and, said microstructure parts are in contact with said mixing zone (Figure 1 & 2, C2/L40-C3/L6). The length of the grooves is in the millimeter range or less (C2/L40-53), thus the grooves inherently have a length that is sufficient for flow control but which minimizes pressure for a given throughput. The reference also discloses that this design of micromixer allows for separate admission of fluids into the mixer and the microstructure flow guides allows for the mixing time to be minimized and reduces dead volume spaces (C1/L56-63, C2/L10-24).

While the reference does disclose that the static micromixer is assembled in a series of plates (C2/L40-C3/L6), Schubert et al. does not disclose that the plates are in the shape of a disk, rather, Shubert et al. discloses a pentagon shape (C2/L62-67). It is well known in the art that the plates of a static micromixer can have a variety of shapes of configurations, including circular and polygonal shapes (as evidenced by Ehrfeld et al. (US 2003/0039169, Figure 3a & Shubert et al. Figure 1). The change in configuration of shape of a device is obvious absent persuasive evidence that the particular configuration is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the plate of Schubert et al. to include a disk shape as opposed to a polygonal shape, as taught by Ehrfeld et al, since doing amounts to nothing more than the substitution of one plate design for another, both of which are recognized in the art of micromixers.

It would have been obvious to one having ordinary skill in the art at the time of the invention to use a static micromixer to mix the fluid phases in the extraction process of Hemming, as taught by Schubert et al., since static micromixers are known to be used in extraction processes in the art and the micromixer of Schubert et al. allows for mixing times and dead volume spaces in the mixer to be minimized, thus increasing mixer efficiency.

Further, specifically regarding **claims 22 and 23**, the use of the static micromixer in the method of Hemming would allow for a first feed stream of a first fluid from a first inlet opening of a static micromixer through a first linking channel to a first outlet opening and directly into a mixing zone of said micromixer said first feed stream being divided only by microstructure parts into part channels immediately prior to entering said mixing zone and also delivering a second feed stream of a second fluid to said mixing zone in a similar manner such that the two streams mix together in the mixing zone (Figure 1 & 2 of Shubert et al.).

Regarding **claim 2**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein the micromixer comprises a housing at least 2 fluid inlets, and at least one fluid outlet, and the housing contains two or more of said at least one component in the form of a disk arranged into a stack (Figure 1 & 2, C3/L33-38).

Regarding **claim 4**, modified Hemming discloses all of the claim limitations as set forth above, but does not explicitly disclose that an extraction agent is conveyed through the main channel and the first fluid containing the substance to be extracted is

conveyed through at least one subsidiary channel of the micromixer. However, the substance to be extracted and the extraction agent would inherently flow from the subsidiary channels into the main channel during the mixing operation.

Regarding **claim 5**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein, at the outlet into the mixing zone, the widths of the part channels of the disks are from 1 μm to 2 mm (C2/L49-53, 10 microns up to mm size, preferably less than 500 microns). It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because selection of overlapping portion of ranges has been held to be a prima facie case of obviousness. *In re Malagari,* 182 USPQ 549.

Regarding **claim 6**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein the ratio of the greatest width of the linking channel and/or the width of the inlet opening to the width of the part channels of the at least one disk is greater than 2 (linking channel would be the fluid admission chamber, inherently it must be at least twice as large as the individual part channels/grooves, Figure 1, linking channel must be at least as wide as the plurality of grooves plus the wall thickness between the grooves, C2/L40-53).

Regarding **claim 7**, modified Hemming discloses all of the claim limitations as set forth above. The references do not explicitly disclose the process wherein the ratio of the length to the width of the part channels of the at least one disk is from 1:1 to 20:1. However, since the instant specification is silent to unexpected results, it would have

been obvious to one of ordinary skill in the art to change lengths/widths of the part channel outlets, the widths of the linking channels and the width of the mixing channel, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding **claim 8**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein the ratio of the width of the mixing zone to the width of the part channels of the at least one disk is greater than 2 (mixing zone 9C inherently must be at least twice as large as the individual width of the part channels and their separating walls, Figure 1 & 2, C2/L40-53).

Regarding **claims 3 and 9-15**, modified Hemming discloses all of the claim limitations as set forth above. Schubert et al. does not disclose the features of the device configuration in which the micromixer is in the form of stacked disks.

Regarding **claim 3**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Ehrfeld et al. discloses the process wherein a plurality of disks

are superposed on one another so that the inlet openings form subsidiary channels for introducing the liquid phase that is to be mixed, the mixing zones together form a main channel for removing the mixed phase and the main channel and subsidiary channels extend through the stack (Figure 3a, opening 4a on supply element 2b, supply channels 4a, 4b, [0051]).

Regarding **claims 9 and 10**, Ehrfeld et al. discloses the process wherein:

- the at least one disk is additionally provided with at least one flow-through opening (Figure 3a, opening 4a on supply element 2b)
- at least one of the inlet openings or flow-through openings or the mixing zone of the disk is enclosed by the plane of the at least one disk and the linking channel is formed by an indentation (Figure 3a, opening 4a on supply element 2b, opening 7)

Regarding **claim 11**, while Ehrfeld et al. does not explicitly disclose the process wherein at least one of the inlet openings or flow-through openings or the mixing zone of the at least one disk is disposed at the edge of the disk or as a recess at the edge of the disk in the currently cited embodiment, the reference does show inlet opening disposed at the edge of disks in separate embodiments (Figure 1a, supply channel 4). Therefore, it would be obvious to one having ordinary skill in the art to change the configuration of the inlet opening in the process of modified Hemming since the change in the configuration of a device is obvious absent persuasive evidence that the particular configuration is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Regarding **claims 12-14**, Ehrfeld et al. discloses the process wherein:

- the at least one disk is provided with at least two inlet openings for at least two different fluid streams and each inlet opening is connected with the mixing zone through a linking channel (Figure 3a, [0051], supply channels 4a, 4b)
- the at least one disk is provided with two inlet openings for two different fluid streams, each inlet opening being connected with the mixing zone through a linking channel, and the outlet openings of the two linking channels are disposed opposite one another (Figure 3a, supply channels 4a, 4b, [0051])
- the outlet openings of the at least one disk are arranged on a circular line (Figure 3a, openings at the end of microchannels 34)

Regarding **claim 15**, Ehrfeld et al. discloses the process wherein the at least one disk is provided with additional through-holes and additional part channels that are integrated into the microstructure units and are separated from the part channels (Figure 3a, supply element 2b has through holes 4a and multiple part channels 31-34 associated with supply channels 4b). Further, it is noted that the addition of more through holes and part channels would have been obvious to one having ordinary skill in the art at the time the invention was made. Mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 124 USPQ 378, 380 (CCPA 1960). Further, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

The modification of the stack of plates of Schubert et al. into a stack of disks, such as that shown by Ehrfeld et al., amounts to nothing more than the change in the configuration of shape of a device. The operation of the device would remain the same, therefore, one of ordinary skill in the art would have reasonable expectation of success. It would have been obvious to one having ordinary skill in the art to obtain the details of a stacked disk configuration as opposed to a stacked plate configuration which are missing from Schubert et al., by performing a literature search or by reviewing known references in the art of static micromixers, such as Ehrfeld et al.

Regarding **claim 16**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein the linking channels of the disks are formed by indentations, and the linking channels before opening into the mixing zone are divided into part channels by the microstructure units parts disposed on the disks (C2/L40-57, Figure 1 & 2).

Regarding **claim 17**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein the linking channels of the disks are formed by recesses in the disks, the disks being disposed as intermediate disks between a cover disk and a bottom disk, and the linking channels before opening into the mixing zone are divided into part channels by microstructure parts disposed on the cover disks and/or bottom disks (Figures 1 & 2, C2/L40-57, C3/L33-38).

Regarding **claims 18-19**, modified Hemming discloses all of the claim limitations as set forth above, but does not explicitly disclose that the flow rate of the fluid stream

into the mixing zone is greater than the flow rate of the fluid mixture within the mixing zone or that the mixing in the mixing zone occurs at least in part by turbulence. However, as a fluid stream exits from a narrow channel into a large chamber, the flow rate of the stream will inherently decrease. Further, as fluid streams will be exiting into the mixing zone from multiple angles in modified Hemming, there will inherently be turbulent mixing.

Regarding **claim 21**, modified Hemming discloses all of the claim limitations as set forth above. Additionally, Schubert et al. discloses the process wherein a width of each of the part channels is from 5 μm to 250 μm (C2/L40-57, width of grooves is 10 microns to mm range, preferably less than 500 microns). It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because selection of overlapping portion of ranges has been held to be a prima facie case of obviousness. *In re Malagari,* 182 USPQ 549. The references do not explicitly disclose the process wherein the ratio of the length to the width of the part channels of the at least one disk is from 8:1 to 12:1. However, since the instant specification is silent to unexpected results, it would have been obvious to one of ordinary skill in the art to change lengths/widths of the part channel outlets, the widths of the linking channels and the width of the mixing channel, since such a modification would have involved a mere change in the size (or dimension) of a component. A change in size (dimension) is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a

recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed device is not patentably distinct from the prior art device, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Response to Arguments

2. Applicant's arguments with respect to **claims 1-23** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHERINE ZALASKY whose telephone number is (571) 270-7064. The examiner can normally be reached on 7:30am - 6:00pm Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KZ/
6 April 2010

/Vickie Kim/
Supervisory Patent Examiner, Art Unit 1797